PARK GUIDE 8

FEB 1988

PENNSYLVANIA
TRAIL OF GEOLOGY

HISTORY OF THE ROCKS

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DOCUMENTS SECTION

GEOLOGY OF V

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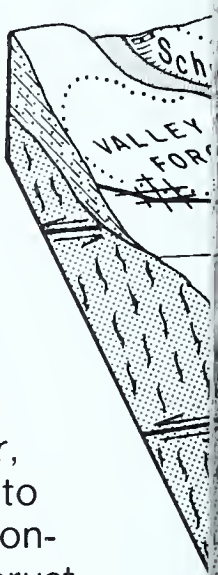
Triassic red beds in the northern part of th
the north.

QUARTZITE HILLS: The hills in the park were formed because the rocks underlying them are more resistant to erosion than the other rocks in the area. Mt. Joy and Mt. Misery are made up of quartzite. The quartzite was originally deposited as sand in the sea in Cambrian time, about 600 million years ago. Later, the sand was compacted into sandstone and, finally, after continued burial deeper into the crust of the earth, the sandstone was subjected to heat and pressure and metamorphosed into quartzite.



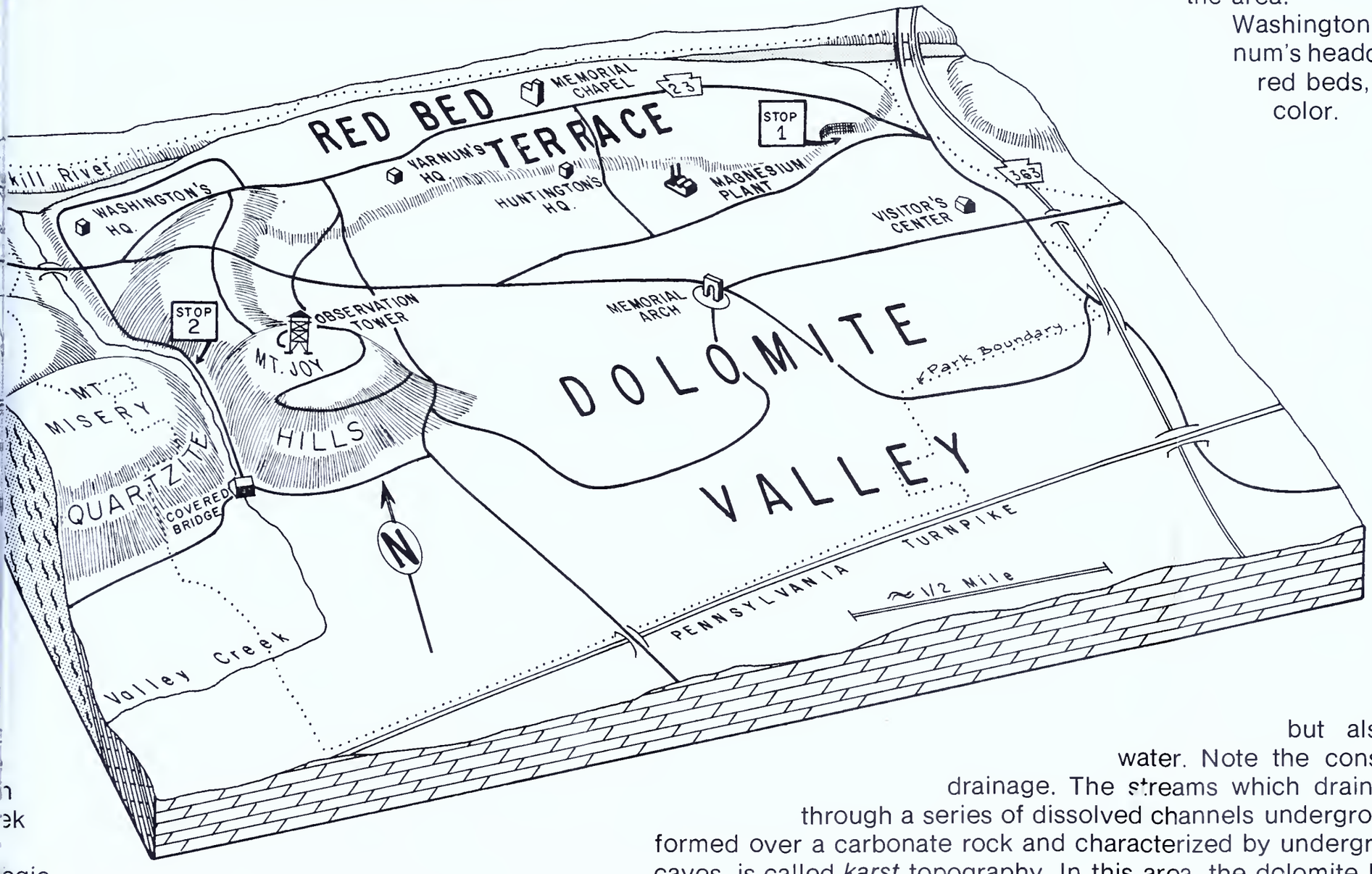
About 250 million years ago, while the Appalachian Mountains were being built to the north, the quartzites and overlying rocks in this area were being uplifted, faulted and tilted. One can see them inclined t the southeast today in the gorge of Valley Cree Part of the gorge is the trace of a fault wh runs through the hills (see "Stop 2. Valley C Gorge").

Washington believed the hills to be of str value, and he built many entrenchments a resses there. The remains of many of thes cations may be seen today.

LEY FORGE STATE PARK

Forge State Park: red beds (sandstones and shales), pes has a different topographic expression in the park. part of the park; the erosion-resistant quartzite under- valley. The rocks range in age from 200 million to 500

belts is seen in the park. The quartzite hills and broad t extends southwest of the park for over 50 miles. The park underlie a lowland belt that stretches 30 miles to



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RED BED TERRACE: Red sandstones lap onto the quartzite hills and form t northern portion of the park. The shales were deposited by streams 2 ago, in Triassic time, and have since gently tilted to the north. Their c color is due to small amounts of iro ing agent, oxidized in the sedim red soil which is visible in s the area.

Washington's, Huntingt num's headquarters were red beds, which expla color.

DOLOMITE

broad, op park is u mite, dep brian sea that was phosed Dolomite rich carl a tempe dissolves only at th mal weath but also undergro water. Note the conspicuous ab drainage. The streams which drain this valley through a series of dissolved channels underground. This ty formed over a carbonate rock and characterized by underground draina caves, is called *karst* topography. In this area, the dolomite has few imp been a valuable resource, mined for its magnesium. The eastern portion tains the remains of a once-extensive mining operation.

During the time of Washington's encampment, this valley was a rolling

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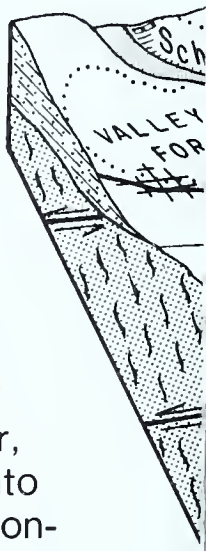

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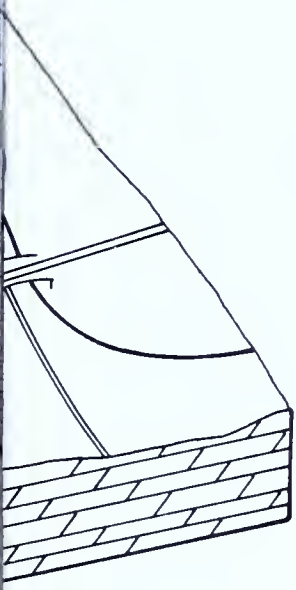
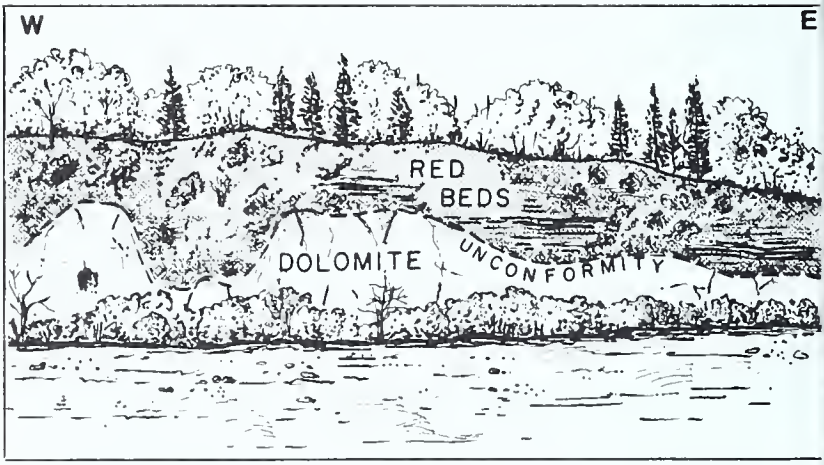
TERRACE: Red sandstones and shales over- the quartzite hills and form the terrace in the portion of the park. The sandstones and vere deposited by streams 200 million years Triassic time, and have since then been only ilted to the north. Their characteristic red is due to small amounts of iron, a strong color- agent, oxidized in the sediments. Notice the ed soil which is visible in several places in the area.

Washington's, Huntington's, and Varnum's headquarters were all built from the red beds, which explains their reddish color.



DOLOMITE VALLEY: The broad, open valley in the park is underlain by dolomite, deposited in Cambrian seas on top of sand that was later metamorphosed into quartzite. Dolomite is a magnesium-rich carbonate rock. In a temperate climate, it dissolves very easily, not only at the surface in normal weathering processes, but also underground by ground . Note the conspicuous absence of surface ams which drain this valley are now flowing annels underground. This type of topography, rized by underground drainage, sinkholes and a, the dolomite has few impurities and so has gnesium. The eastern portion of the park con- g operation.

nent, this valley was a rolling farmland.



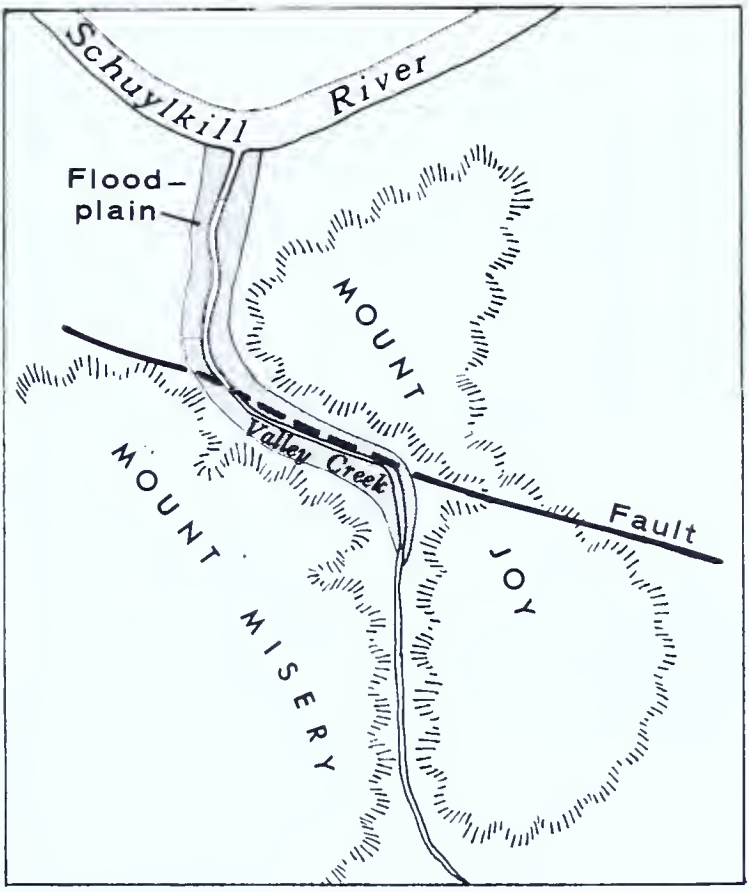
STOP 1. PORT KENNEDY QUARRY

There are three rock types present in the park and two of them are exposed on the face of this quarry wall. The lower gray rock is dolomite, a magnesium-rich carbonate. It was deposited in Cambrian seas 500 million years ago. The upper red rocks are the Triassic red beds, sandstones and shales deposited on land about 200 million years ago. We have no record of the geologic events in this area between those two times other than erosion.

The border between the two rock formations is called an *angular unconformity* because it represents a large gap in the geologic record and separates rocks whose bedding planes have different orientations. The dolomites are inclined about 40° to the south. The red beds are approximately horizontal. Since beds of sediment are deposited horizontally, we know that the dolomite beds were tilted sometime after their deposition. Then, at a later time, the red beds were deposited on top of them.

The quarry wall shows a good cross section of a carbonate erosion surface, the irregularity of the contact representing sinkholes in the dolomite later filled by Triassic sediments.

Note the cave on the quarry wall. A rare find of Ice Age fossils was discovered in a similar cave in this quarry.



STOP 2. VALLEY CREEK GORGE

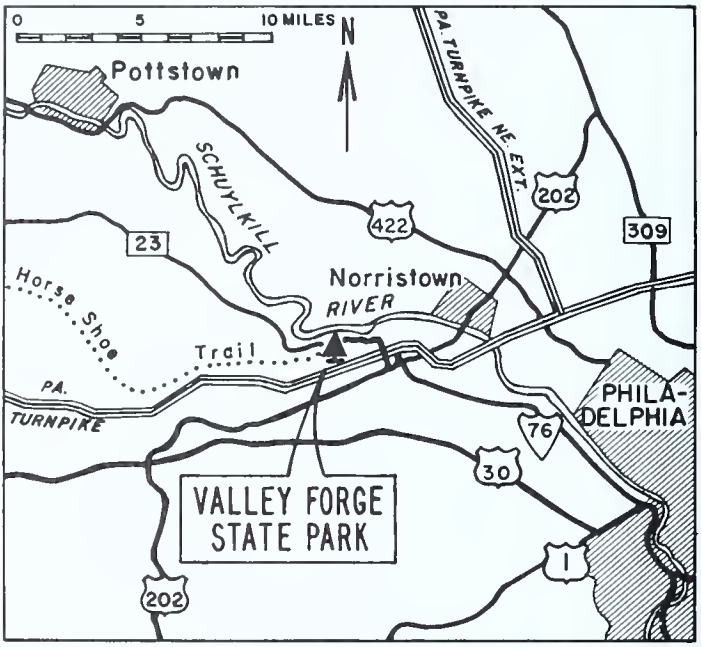
Here, in the middle of the quartzite hills, Valley Creek changes its course from north to northwest. From this point downstream to the confluence of Valley Creek with the Schuylkill River, the gorge is wide enough to contain a floodplain, but upstream, to the south, the floodplain disappears and the gorge becomes extremely narrow. To the east, a *saddle,* or low point, connects the two peaks of Mt. Joy.

The topography in this area is partly due to a northwest-southeast-trending *fault,* a zone of fracture and displacement in the earth's crust, which extends through the stream valley and between the two peaks of Mount Joy. The *trace* of this fault is shown on the map above. It is not unusual for streams to follow faults, joints and other zones of weakness in the earth's crust.

Peter L. Samson
Geologist

VISITING HOURS

9:00 A.M. to 5:00 P.M.
Year Around



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DEPARTMENT OF ENVIRONMENTAL RESOURCES

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